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An imaging proton spectrometer for short-pulse laser plasma experiments

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Ultra intense short pulse laser pulses incident on solid targets can generate energetic protons. In addition to their potentially important applications such as in cancer treatments and proton fast ignition, these protons are essential to understand the complex physics of intense laser plasma interaction. To better understand these laser-produced protons, we designed and constructed a novel, spatially imaging proton spectrometer that will not only provide at high-resolution the energy distribution, but also the protons angular characteristics. The information obtained from this spectrometer complements those from other methods using radiochromic film packs, CR39 films and other protons spectrometers. The basic characterizations and example data from this diagnostics will be presented. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344, as part of the Cimarron project funded by LDRD-09SI11.